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A RESTORATION & MANAGEMENT PROGRAM FOR ELL POND

City of Melrose, Massachusetts

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Metropolitan Area Planning Council

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A RESTORATION AND MANAGEMENT PROGRAM

FOR ELL POND

CITY OF MELROSE, MASSACHUSETTS

DECEMBER, 1981

METROPOLITAN AREA PLANNING COUNCIL

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ABOUT THIS REPORT

This report was prepared at the request of the city of Melrose by the staff of the Metropolitan Area Planning Council. The Metropolitan Area Planning Council is the officially designated regional-planning agency for 101 cities and towns in the Boston metropolitan area. The Council helps its member communities plan in the areas of land use, housing, environmental quality, transportation, and economic development.

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Elizabeth A. Bransfield, President
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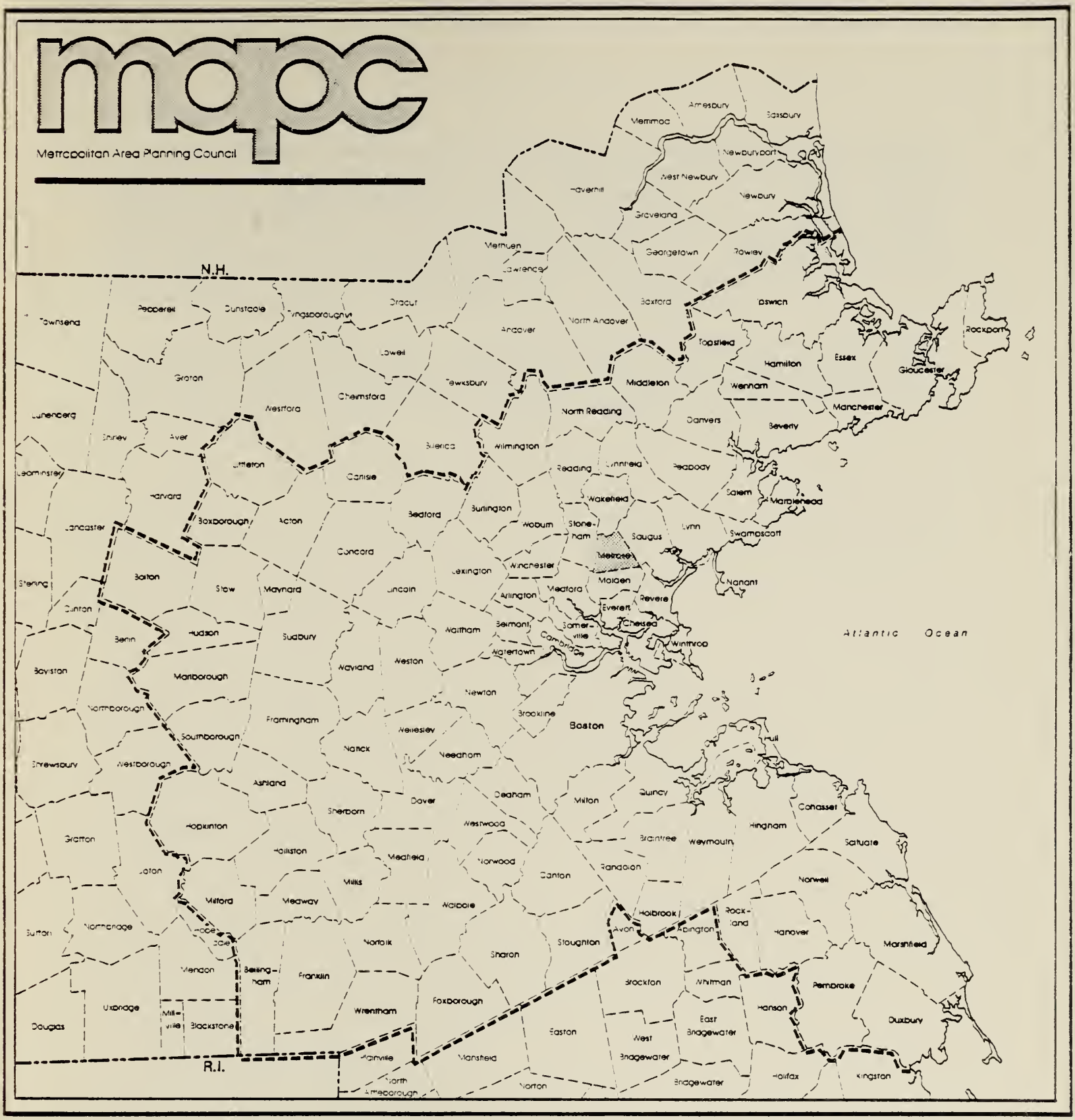
Patricia Brady, Treasurer
Woburn

Donald E. Megathlin Jr.
Executive Director

Credits

Project Manager/Writer:	Arleen O'Donnell
Technical Review:	Allison Harper Jonathan G. Truslow Donald E. Megathlin Jr.
Editing:	David Moran
Graphics:	Joan Driebeek
Production:	Ladis P. Bernier Michael Furnari John Trainor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Milford
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Bellingham
Franklin
Wrentham
Norfolk
Blackstone
Millville
Uxbridge
Douglas
Sutton
Northbridge
Mansfield
North Attleborough
Norton
Plainville
4 2 0 4 8 12
Scale in Miles
NORTH
MAPC boundary
Drawn: September, 1978.

Abstract

This report summarizes all existing information on Ell Pond and its watershed (drainage area) and recommends a plan for Melrose to follow to restore the pond for recreation. Since 1951, when swimming was banned because of poor water quality, the city has undertaken a number of unsuccessful attempts to clean up Ell Pond, the city's most valuable natural resource. The purpose of MAPC's investigation was to determine what information exists on the pond and, based on it, develop a procedure for restoration.

This report contains information on the quality of Ell Pond, on potential sources of pollution, sources of funding to restore the pond, and on watershed-protection measures to be implemented to avoid further degradation of this valuable resource.

Summary of Action Plan for the Restoration of Ell Pond

The first approach to an effective and comprehensive restoration program for Ell Pond concerns the pond itself. The best way of cleaning the pond is determined by its water quality, pollution problems, and intended recreational uses. There are a number of these restoration methods that may be considered, including drawdown (draining), dredging, aeration, weed harvesting, chemical control, and nutrient inactivation.

In order to identify the most appropriate technique, it is crucial to determine the pond's biological, chemical, and physical characteristics as well as the water quality of its tributaries. The Massachusetts Division of Water Pollution Control conducted a baseline (preliminary) water-quality survey undertaken at the request of Melrose and MAPC as the first step in this process. Based on the results of this survey, and corroborated by past studies, the pond shows four major symptoms of pollution: high bacteria levels, algae, high turbidity (muddy bottom, shallow depth, and high rate of sedimentation), and oil and grease on the surface and in sediments. The next step is to conduct a diagnostic/feasibility study, that is, to diagnose the cause of the pond's problems and to evaluate methods and costs of restoration. In the final step, the proposed method of clean-up, as determined by the study, is implemented.

1. Formation of a Pond-Management Committee

To date, a number of city officials and residents have been meeting with the Council. A committee consisting of interested officials and citizens should be formed to follow through with the recommendations of this report and to monitor the status of the city's grant application under the Clean Lakes Program. (A formal committee adds strength to the city's application, is a valuable source of information, and can help gain public support, which is critical to the success of any restoration project.)

In addition to city officials, representing the Conservation Commission, Planning Board, Park Department, Engineering/DPW Department, Community Development, Board of Health and the Mayor's Office, abutters of the pond and other interested citizens' groups should be invited to participate. Leonard Peterson, of 21 Lake Avenue, has indicated a willingness to coordinate citizen involvement.

2. Gathering Data

This report contains information on existing data for Ell Pond and its watershed. More information is necessary on possible sources of pollution. The Pond-Management Committee should continue gathering data and coordinate its identification of pollution sources with the city's hazardous-waste coordinator and DEQE's diagnostic study. (The more information that is obtained before Phase I of the restoration program even begins, the sooner it can be completed.) Also, the chance of obtaining funds from the state and EPA to conduct the study will be increased if a lot of the groundwork has already been done.

3. Determining Pollution Sources

As a result of the data gathering, potential sources of pollution have been identified. The diagnostic study will analyze them. The committee can again be of great assistance by informing DEQE of possible sources of pollution in the watershed.

4. Sources of Funding for Pond Restoration

It is recommended that the city of Melrose pursue funding for both the EPA and, later, the state's Clean Lakes Program. The city should act immediately to support passage of the latter, H.6667. (Currently, it is before the House Ways and Means Committee, Michael Creedon, chairman.)

The city should also request staff assistance from the Middlesex Conservation District for soil erosion and sedimentation controls. An application form is enclosed.

5. Application for Funding

The city of Melrose, through the office of the mayor, should take the following steps to apply for Phase I of the Clean Lakes Program grant:

a. Send a letter, stating the need for the project with supporting documentation as outlined in the Action Plan, to the DEQE Division of Water Pollution Control.

b. DEQE will complete the application, using the information obtained in their survey, and forward it to EPA.

c. The Pond Management Committee should contact DEQE periodically to check the status of the application, to find out when state funds (H.6667) can be applied for, and to provide any additional documentation to give Ell Pond a higher rating.

6. Implementation of General Watershed-Protection Measures

The preceding five steps all have to do with pond restoration. The second approach that is necessary for an effective pond-restoration program is watershed protection. Although the diagnostic study will analyze watershed pollutants, keeping them from degrading the pond further largely depends on land-use controls that must be adopted by the city.

A number of watershed controls can be implemented immediately. It is recommended that the following be implemented:

a. Underground-Fuel-Storage Bylaw
b. Fuel- and Hazardous-Materials-Spill Contingency Plan
c. Public-Education Campaign to Reduce the Use of Polluting Fertilizers
d. Urban-runoff controls, such as:

--frequent street sweeping
--frequent catch-basin cleaning
--installing of grease traps in catch basins
--careful design of new drainage projects
--reducing the amount of salt applied to the watershed
--constructing a road-salt storage shed for DPW.

e. An infiltration/inflow study of the sewers in the watershed should be conducted to determine if there are leaks that cause contamination of the pond.

Detailed information on these and other watershed protections is contained in the appendices. The implementation phase of the Clean Lakes Program may require more watershed controls as part of a long-term management plan.

I. INTRODUCTION

Within the past 20 years, there have been several studies of Ell Pond -- and just as many ideas to restore it. Since 1951, when swimming was banned, the feasibility of resuming has become such a frequent topic of study and discussion that hardly anyone takes new attempts seriously. All this has understandably created skepticism about the pond's future.

It would seem that with so many studies already done, there is hardly need for another. However, examination of past studies shows that there has been no comprehensive survey of the causes of pollution, and without knowing what's causing the problem, it's no wonder that the problem has not been solved. Symptomatic treatment, such as chemicals to kill weeds or bacteria, has been considered, but these are only short-term at best. And usually such measures are costly, must be repeated frequently, and ultimately create more problems than they solve. Thus, until there is a diagnosis of the pond's problems, there will be only a superficial understanding of the situation. One must bear in mind that Ell Pond's condition is an indication of what is coming into it from its drainage area. Without measures designed to keep pollutants from reaching the pond, any attempts to restore it will be futile.

II. SUMMARY OF PAST STUDIES

The studies done to date are mostly descriptions of the pond. Water samples have been taken intermittently, and various park designs for the area surrounding the pond have been proposed. Although none of these studies has borne fruit, they are an indication of the city's stong interest in restoring Ell Pond.

As early as 1930, the Melrose Planning Board wrote in the Collaborative Plan of Melrose that "the shores of Ell Pond have great possibilities for beauty. Ell Pond is the pride of Melrose and many thousands of dollars have been spent to acquire and improve the land surrounding it."

In 1958, the Massachusetts Department of Public Health conducted a sanitary survey of the pond, to determine its suitability for swimming. The results showed high levels of coliform bacteria, indicating that the pond was, indeed, unfit for swimming. The source of the fecal contamination was not identified, but three possible sources were cited: sewage from Linden Road entering the pond via a storm drain; septic-system effluent from Wakefield; or pollution from farmland in Stoneham. The study recommended that additional bacterial analyses be taken from the pond's tributaries to verify sources of pollution.

Even as early as 1962, frustration about the inadequacies of past studies surfaced. The Melrose Master Plan, written in 1962, emphasized the need for a community swimming facility, stating that "innumerable studies have stressed the current inadequacy of Ell Pond for swimming, but no really complete study has yet been made which would show the precise method and cost of correcting these deficiencies."

In 1963, the town retained the engineering and consulting firm of Camp, Dresser, and McKee to study making Ell Pond suitable for swimming. In conjunction with their investigation, the city of Melrose conducted a series of soundings to determine the depth of the mud in the pond. Since the filling of the adjacent swampland had begun, in the late 1800s, it was thought that "mud-rolling", the oozing of mud out of the pond's banks, caused by the weight of the fill on the swamp's peat, was gradually filling in the pond.

The results of the soundings showed mud up to 30 feet deep in some areas. Because of the quantity of mud and the subsequent shallowness of the water, the study felt that Ell Pond could not meet state swimming standards for transparency. And in order to meet the standard for bacteria levels, chlorination would be necessary. Chlorination was not recommended, however, because even with it, the standards could not be met consistently. So the study simply stated that the pond should not be swum in.

Five years after Camp, Dresser, and McKee's findings, the Melrose Conservation Commission renewed the city's interest in restoring the pond. The Commission wrote a brief history of the pond, called the "Ell Pond Story", and went on to make three major recommendations:

1. that matching funds be appropriated by the city for a pollution survey by the state;
2. that assistance also be requested from the state Department of Natural Resources (now DEQE) and the Middlesex Soil Conservation District; and
3. that Ell Pond Park remain city-owned.

In accordance with the second recommendation, the Northeast Regional Extension Service prepared a proposal for a recreation area at Ell Pond. The plan, completed in 1970, noted encroachment of floodplain areas as cause for concern and recommended against further filling in of adjacent land. Other recommendations included dredging the pond, installing catch basins in the city's drainage system to prevent more silt from entering the pond, and stabilizing the pond's banks.

The recreation plan proposed a multitude of uses for Ell Park, including picnic and beach facilities, a skating rink, tennis and basketball courts, a playing field, a boathouse, rest areas, a "tot lot," an activities building, and an assortment of appurtenances.

In 1977, another study of the pond was conducted by the Melrose Planning Department, at the mayor's request. This was a comprehensive documentation of past pertinent events, containing some technical data on the pond. It states that the pond's condition is "late mesotrophic," indicating a relatively severe level of pollution. The signs of pollution were mentioned — high bacterial counts, excessive plant growth (caused by high nutrient levels), low oxygen levels (limiting fish survival), and sedimentation. The report speculated that pollution was caused by street runoff, carrying oil, gasoline, fertilizers, sand, salt, and other contaminants directly into the pond via four storm drains and two streams. Sedimentation from continued "mud-rolling" was also suggested. The study admits, however, that "it is impossible to present an accurate, quantitative analysis of the condition of Ell Pond without thorough sampling, testing, and measuring of all the parameters involved."

Ell Pond has also been the subject of two master's theses. The first, published in 1972, contains policy information. It is entitled "Information for Community Resource Decisions: A Guide," and although it contains useful information for developing programs and policies, it does not discuss the resoration of Ell Pond. The second thesis , written in 1979 by a Harvard graduate student, was a sedimentation study of the pond. Mud-depth measurements, similar to the ones taken by the city's engineering department almost 20 years before, showed the continued sedimentation of the pond.

According to the mud-depth profiles taken both by the city and by the graduate student, the areas of greatest sedimentation occur at drainage-pipe outlets. Thus, the theory that the pond's banks are continuing to fall in because of "mud-rolling" from filled swampland is questionable at the least. It seems that any slumping due to increased surface pressure from the fill would have reached equilibrium by now.

This is not to suggest that the filling of adjacent swampland, which was thought to improve conditions, has been without problems.

The adjacent wetlands functioned to filter pollutants, trap sediments, and generally recharge the pond throughout the year. This replenishment of the pond with relatively clean water is now lost. Now the pond is a catch basin for all of the pollutants that drain into it from the watershed, without benefit of any filtration.

The Harvard thesis reiterated that Ell Pond's water quality was deteriorating, its aquatic weeds were proliferating, and sedimentation was building. The paper evaluated such sediment-control options as dredging and stabilizing the banks. Costs of the various methods were included. The study did not, however, address nutrient and bacterial pollution. Only one of the pond's many problems was discussed, and even the conclusions of the sedimentation analysis could not be readily implemented. The report indicated that dredging was likely to accelerate the mud-rolling, and further study of it was recommended.

In the fall of 1980, then, the Melrose Department of Public Works requested that the Metropolitan Area Planning Council prepare an "action plan" for the restoration of Ell Pond. The city's application for assistance noted that "the failure of the (past) studies, however, is that the problems have been identified, but no set of comprehensive procedures or priorities have been outlined for the city to follow. To avoid the risk of yet another study of the problem, what needs to be done is to gather and compile all of the information previously reported and develop a concise action plan."

However, after a review of all past information on the pond, it is necessary to conclude that the information is still inadequate to name all the causes of pollution. The pond's problems have been identified, but there has been no survey of pollution sources to identify the causes of these problems and enable solutions.

Thus it is the purpose of this "action plan" to:

--Summarize the present condition of the pond based on the most recent water-quality data gathered by the DEQE Division of Water Pollution Control's water-quality survey, conducted in July 1981.
--Outline procedures to restore Ell Pond.

III. DESCRIPTION OF ELL POND AND ITS WATERSHED

Ell Pond, slightly north and west of Melrose Center, is within the Mystic River basin. It is 1700 feet long, 1100 feet wide, and has a surface area of 23 acres. Its watershed encompasses approximately 200 acres, most of which are within the city of Melrose. The watershed includes about one-fourth of the city and small portions of Wakefield and Stoneham (see Figure 1).

The pond is a glacial "kettle" pond, created when a large chunk of ice broke off from the retreating glacier and became lodged at the site. As the ice melted, the hole filled with water. The size of the pond has been modified over the past century. In the 1600s, a dam was built at the pond outlet that nearly doubled its size. Eventually, the dam was removed and much of the pond's adjacent wetlands were filled.

The pond is fed by three streams and four storm drains. It also receives groundwater from a high-yield aquifer. The aquifer is more than 30 feet thick, and flows south beneath the pond. Approximately 3000 feet wide, the aquifer is estimated to yield more than 300 gallons per minute when pumped(see figure 2).

Nearly 100 percent of the watershed is urban. In Melrose, it is zoned high-density residential and business. Most of the wetlands and floodplain areas in the watershed have been filled, portions of some streams have been piped, and sewers and street drains have been installed.

Land uses in the watershed are for the most part consistent with zoning (see figure 3). In addition to single- and multi-family residences and businesses, there are schools, a fire station, and the DPW garage. There is one remaining farm, on Franklin Street in Stoneham.

Past studies of the pond have shown coliform levels to be above the state's swimming water standards since 1951. In 1970, Camp, Dresser and McKee reported bacterial counts of up to 10,000 in the streams flowing into the pond. This is ten times the permitted amount for swimming.

As noted, the most recent water-quality study of the pond was done in July of 1981. In response to the city's request, the state Department of Environmental Quality Engineering's Division of Water Pollution Control conducted the baseline water-quality survey of the pond. The data are presented on pages 44-47.

At its deepest, the pond was found to be only ten feet deep. As recently as the mid-1970s, the state's "lakes survey" indicated the maximum depth to be 12 feet with a mean depth of six feet, indicating rapid sedimentation.

FIGURE 1

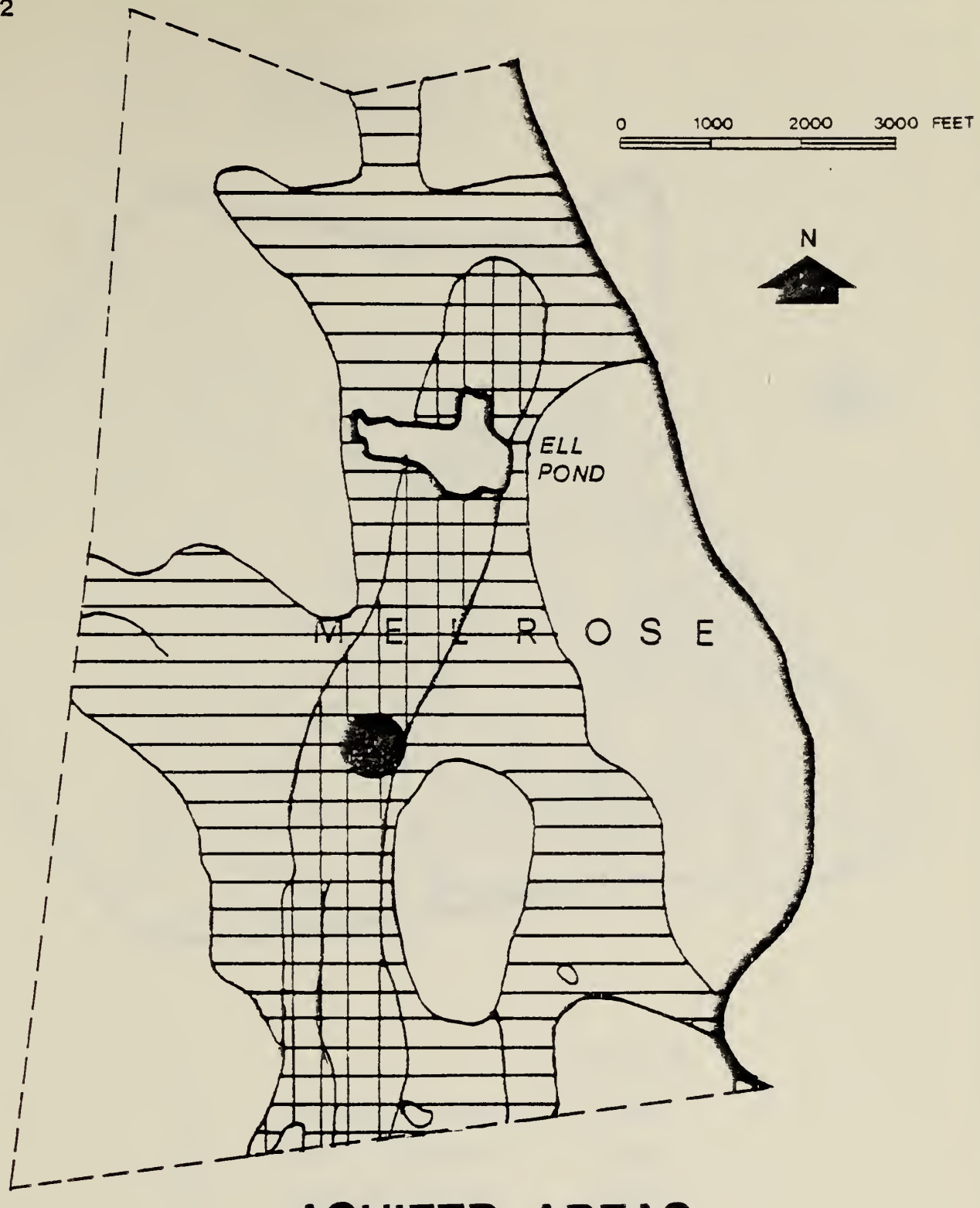
ELL POND WATERSHED

N

0 1000 2000 3000 FEET

SOURCE: MAPC Water Quality Project, Mystic River Basin, Sub-Basins

FIGURE 2



AQUIFER AREAS

300 GALLONS PER MINUTE OR MORE

25-300 G.P.M.

LESS THAN 25 G.P.M.

PUBLIC WATER SUPPLY WELL

SOURCE: MAPC Water Quality Project, Mystic River Basin, Groundwater Favorability

FIGURE 3

ZONING

		Lot Area (sq. feet)
BB	Extensive Business	10,000
BC	Medical Business	5,000
BD	Local Business	5,000
BA-1	General Business	5,000
UR-A, UR-B, UR-C	Urban Residence	7,500

0 1000 2000 3000 FEET

SOURCE: Zoning Map of the City of Melrose; MDPW Base Map

As previous reports had speculated, oxygen is depleted near the bottom of the pond during the summer and thermal stratification (a layer of cold water under a layer of warm water) occurs at the deepest area of the pond. The water is nutrient-rich, especially in phosphorus, which causes excessive algae and weeds.

The coliform level in the pond was 600 colonies per 100 ml sample, while one of the pond's tributary streams had the extremely high count of 9000. These results are comparable with the tests taken in 1970, and indicate continuing fecal contamination.

The pond's transparency was only .6 meters (less than two feet), which is far below the state's swimming standard of at least four feet. Transparency is measured by a black-and-white disc (called a Secchi disc) that is lowered into the water. The transparency of the water is determined by the depth at which the disc is no longer visible. Low transparency is characteristic of shallow ponds, where bottom mud and inflowing sediment are easily suspended and where there is excessive algae growth, turning the water brown.

The state's survey also noted that pond sediments were full of gas and oil and that a greasy scum lay on the surface.

Based on these most recent water-quality data, as corroborated by the pond's past history, and based on land uses in the watershed, Ell Pond's major pollution problems, their causes, and possible sources of pollution are listed below.

	Problem	Cause	Possible Sources
1.	Algae and weed growth	High nutrient levels (nitrogen, phosphorus)	Fertilizers, runoff, sewage
2.	Muddiness	Sedimentation, shallow depth	Runoff, erosion
3.	High bacteria levels	Sewage, animal waste	Leaky sewers, runoff, farms
4.	Grease slick on surface and oil in sediment	Vehicles, fuel storage	Runoff from streets and railroad bed, fuel spills

As can be seen from the chart, most of Ell Pond's problems are caused by the building up of its watershed. When the wetlands were filled, the pond lost a valuable pollutant buffer and water-recharge area. This loss, combined with the spread of paved surfaces, which increases stormwater runoff and other pollutants, has degraded the water quality. Urban-related activities, such as road salting and the installation of fuel tanks and sewers, further threaten to pollute Ell Pond.

IV. ELL POND ACTION PLAN

Step One: Organization and Pond-Management Committee

The city of Melrose Public Works Department should initiate a Pond-Management Committee, which would gather information, assist in the development of a management program and obtain public support for restoring the pond.

It is recommended that the Pond-Management Committee consist of representatives from the Conservation Commission, Planning Board, Department of Public Works, the Mayor's Office, Park Commission and Board of Health. Other interested townspeople, especially watershed residents, should be encouraged to participate. Letters should be sent to the town boards, explaining the purpose of the committee and requesting the appointment of a board representative. Or those present at past meetings can act as the committee and others may be added.

The most important function of the committee is to generate public support for the pond-restoration project. In order to be considered for Phase I assistance under the EPA clean-lakes program, support and commitment on the part of the city must be demonstrated. The committee should petition city officials to demonstrate such commitment. The committee should write newspaper articles to inform residents of the restoration effort, to notify them of meetings, and to offer the opportunity for the public to participate. And the committee should serve as liaison between the city and the state.

Step Two: Data Gathering

All of the existing information on Ell Pond and its watershed was obtained and reviewed by MAPC staff. Based on this information, a summary of existing conditions in Ell Pond and its watershed was prepared (see Sections II and III of this report). The committee should review the summary, and make any necessary additions or changes.

The following watershed information was used for preparation of the summary:

Data	Source of Information
Soils	US Soil Conservation Service
Zoning and Land Use	Town maps
Groundwater	US Geological Survey
Topography	US Geological Survey
Wetlands and floodplains	Town maps
Past studies, reports, etc.	Conservation Commission, Planning Board, Public Works

It is recommended that the study committee obtain the following additional information for specific location of possible sources of pollution and precise delineation of the watershed area:

Data	Source of Information
Sewer system	Department of Public Works
Street drainage system	Department of Public Works
Location of underground fuel tanks	Fire Department

Step Three: Determining Pollution Sources

Determination of the factors causing accelerated eutrophic conditions is a necessary step in a pond-management program. Unless the sources of pollution are determined, any restoration effort will be short-lived, at best. At worst, money will be wasted by attempting to treat recurring symptoms without curing the disease.

The purpose of the Phase I Diagnostic/Feasibility Study is to determine causes of pollution and develop a restoration program that best suits the pond's problems and recreational purposes. The city can be of great assistance in identifying pollution sources and can begin prompt implementation of "housekeeping" measures for watershed management.

There are some potential sources of pollution within the watershed that are obvious, such as street runoff, while others are less obvious. Based on land uses in the watershed and past studies, potential sources of pollution are presented in Table 1. Other sources of pollution, such as uncovered de-icing salt piles, pesticides, etc., can be identified from the information gathered under Step Two and by visual observation.

Step Four: Sources of Funding for Pond Restoration

Currently, there are two sources of funding for pond restoration that should be investigated.

1. US Environmental Protection Agency Clean Lakes Program.

The federally funded Section 314 Clean Lakes Program has been funded for fiscal year 1981-1982. Nine million dollars has been appropriated.

On the state level, legislation to establish a Clean Lakes Program has been given a favorable report by the Committee on Natural Resources and Agriculture and is pending approval in the House Ways and Means. No new expenditure of state funds is involved; rather, appropriations would be authorized from the existing Clean Waters Act bond issue.

Funding under the Clean Lakes Program would be given in two stages: Phase I — diagnostic/feasibility study, and Phase II — implementation. If the state Clean Lakes Program is passed by the Massachusetts legislature, 314 funding will be distributed as follows:

	Federal Share	State Share	Local Share
Phase I	70%	30%	0%
Phase II	50%	25%	25%

Lake-restoration projects having long-term effects that eliminate or reduce sources of pollution will be given preference over those that deal only with the symptoms of degradation. The grants cannot be used for temporary measures such as chemical treatment or for point-source controls that are regulated under other sections of the Clean Waters Act. The Division of Water Pollution Control's Lake Classification Program, which assigns pollution-severity points to lakes and ponds, will be one of the criteria used in selecting projects for funding. Evidence of strong local support will increase a project's rating on the 314 priority list.

Since state funds for the Clean Lakes Program have not yet been appropriated, the city will have to apply for state funds separately. Application for federal funds unser Section 314 can be made immediately. The city will have to wait, however, until the state clean-lakes bill is passed and application procedures are established to apply for state funding.

2. DEQE Eutrophication and Aquatic Vegetation Control Program

In addition to the Clean Lakes Program, the DEQE Division of Waterways administers the Eutrophication and Aquatic Vegetation Control Program, which used to be primarily chemical treatment but more recently has begun to use other means of controlling nuisance vegetation. The total budget for the program is $100,000, which is divided among several communities. The application form is very detailed, and the cost of completing the application form can be more than the restoration grant that is received. Some of the necessary information can come from the baseline study; however, much of the hydrologic data required must be developed by a professional hydrologist or limnologist. Funding decisions under this program are based on:

- the degree to which aquatic nuisance(s) or conditions of accelerated eutrophication pose a potential or existing hazard to public health and welfare;

- the degree to which nuisance vegetation or other conditions of accelerated eutrophication impair the recreational use of the pond by the general public;

- the importance of aquatic vegetation to fisheries and other wildlife resources;

- the factors causing the accelerated eutrophic conditions and/or aquatic nuisance(s);

- the appropriateness of the proposed program as it pertains to the long- and short-term relief of the aquatic nuisance(s) and/or the reduction of the accelerated eutrophication process;

- the environmental impacts and benefits of the proposed program;

- the economical and social benefits and detrimental impacts associated with the proposed program;

- the regional need for the proposed program;

- the degree of involvement demonstrated by the applicant to improve the quality of the lake (or pond) and its watershed by sound long-term management practices;

- the consistency of the proposed program with other programs such as sections 201, 208, 314, and 404 of the Clean Water Act (the Federal Water Pollution Act as amended by the Clean Water Act of 1977);

- an analysis of the effectiveness of such programs implemented under previous authorization; and

- whether the proposed program adequately protects the interests described in the Wetlands Protection Act.

For this program, municipalities must first submit a short preapplication by January 1, which is reviewed during the month of January. If accepted, the municipality then must submit a detailed final application, which is due by October 1. Final notification is by the following January.

For more information on the program, contact:

Mr. Mario Boschetti
DEQE Division of Waterways
100 Nashua Street
Boston, MA 02114

3. US Soil Conservation Service

The Middlesex Conservation District offers technical assistance for watershed management, particularly in the area of erosion and sedimentation controls. Since sedimentation is a documented problem in Ell Pond, it would be worthwhile to apply to the Conservation District for assistance. Application forms can be obtained from

the Middlesex Conservation District, P.O. Box 147, Littleton, MA 01460. The Conservation District provides assistance free of charge.

It is recommended that the city apply for funding under the Clean Lakes Program (both state and federal) and assistance from the Middlesex Conservation District. An application for assistance from the Middlesex District Commission is attached.

Step Five: Funding a Pond-Restoration Program

In order to be considered for Phase I funding under the federal Clean Lakes Program, the following information must be submitted:

- Proof of public access to the pond. An assessor's map or property deed showing city-owned land is sufficient.

- Proof of public support and commitment for the project. Letters of support from city officials, public groups, etc. should be included. The city should also demonstrate financial commitment for the project by stating its willingness to appropriate matching funds or in-kind services.

- Past studies, data and information on the pond and its watershed should be submitted to show past efforts that have been made to restore the pond and to show that there is a substantial data base readily available.

- The need for the restoration project should be demonstrated. Excerpts from the city's Master Plan or Open-Space Plan and a statement from the City Park Department should be included.

- Results of the baseline water-quality survey, which was conducted for Ell Pond on July 27, 1981.

- This report should be included.

The above information should be sent as an application package to:

Mr. Eben Chesebrough
Massachusetts Department of Environmental Quality Engineering
Division of Water Pollution Control
P.O. Box 545
Westboro, MA 01581

cc: Commissioner Anthony Cortese
DEQE
1 Winter Street
Boston, MA 02108

The cover letter should be signed by the mayor. The city should request notification of application procedures for state funds as soon as they are appropriated.

When DEQE receives the city's application, they will complete the federal grant application form and send it to the U.S. Environmental Protection Agency. There, it will be ranked. The city should contact the Division of Water Pollution Control periodically to check the status of the Ell Pond application and to find out if the city can do anything to give it a higher-priority rating.

If funding for Phase I of the restoration program is obtained, it will be used for the diagnostic/feasibility study. This study will serve to ascertain sources of pollution and to determine the most appropriate restoration techniques and relative costs. In the process of this determination, information will be generated for the Phase II application, including the following:

- identification of the pond's size, depth, detention time, and relation to upstream and downstream waters;
- geology of the drainage basin;
- historical lake uses, in relation to uses of other lakes within 50 miles;
- inventory of point-source domestic or industrial discharges and proposed abatement;
- discussion of water-quality problems, including test data;
- discussion of anticipated improvements;
- identification of proposed restorative actions, including technical feasibility and estimated costs;
- alternative measures and why they were rejected;
- discussion of the particular public benefits expected, including new public water supplies;
- relation to other abatement programs, such as water-pollution control; and
- proposals for monitoring during implementation of program and for at least one year after completion, including highly technical baseline data.

Step Six: Implementation of General Watershed-Protection Measures

For long-term management of Ell Pond, there must be a two-pronged approach: restoration of the pond and protection of its watershed area. Watershed-protection measures are necessary to control sources of pollution and to maintain the pond once it has been restored.

Once all available information about the lake and its watershed has been gathered and pollution sources pinpointed as much as possible, the Committee should investigate a number of local management techniques for improving or protecting lake quality. Some general watershed-protection measures can be implemented at the same time or even before the in-lake feasibility study gets underway, in order to protect the pond from further degradation.

After reviewing the various measures, described below, the Committee should determine which is most appropriate to address the particular issues and problems in the watershed.

Zoning Changes and Land-Use Practices

Land-use controls are important because lakes are particularly sensitive to changes in topography and natural drainage patterns. Improper land uses or siting of structures (as well as waste-disposal facilities) can result in erosion of the shoreline, excessive siltation, and the introduction of contaminants into the lake.

Non-structural controls in watershed management include changes in zoning regulations and land-use practices to avoid potential lake degradation. The adoption of a watershed-protection district or a shoreline-protection program could serve to regulate development in the watershed by establishing minimum lot sizes and building setbacks and defining erosion-prevention and vegetation practices; restricting silvicultural and agricultural practices within critical watershed areas; and, where necessary, discouraging development of portions of the shoreland. Since Ell Pond's watershed is almost totally developed, a watershed-protection district is not recommended.

Controlling Storm-Water Runoff

As rain falls to the ground some of it percolates into the soil. In an urban area, most of it runs off the land, seeking a lower elevation. Runoff picks up silt, debris, inorganic elements deposited by man and organic wastes left by animals or decaying vegetation. All these elements can cause harm to a water body.

Siltation caused by runoff to a pond or lake can cause a loss of the storage capacity of the water body and excessive turbidity. Runoff can also accelerate eutrophication by bringing nutrients into the water body.

The quality and velocity of storm-water runoff are affected by the amount of paved surfaces and the slope of the land. Typically, man-made development of the land with buildings and roads decreases the ability of the land to absorb water from rainstorms or melting snow.

In order to reduce the erosion potential of storm-water runoff on lots, roads, and beaches and to avoid pollution of the lake from runoff, storm water should be stored or detained as much as possible. This storage can occur naturally in the landscape, in surface depressions and on land that has thick vegetation. It can also be stored temporarily and allowed to be released slowly, as with the use of "dry ponds," trenches or swales or even parking lots which are designed to permit easy percolation. It can be stored "permanently" in ponds or stream channels.

When excess water which cannot be stored must be transmitted over land to a receiving water system, natural overland flows or open channels should be a preferred method rather than enclosed systems. However, the alignment of open channels must be coordinated with the layout of lot and street patterns and grades. This could cause a problem in areas where the lots are close together and the grades are relatively steep.

In an enclosed system, the components should be designed to help manage storm water, not just dispose of it. Energy dissipators and other outfall protection devices may be needed when the discharge is onto highly erodable soils. Siltation ponds may be necessary to reduce erosion and to prevent pollutants from being discharged directly into the lake (see Appendix F).

Road-Salt Practices

In addition to the urban runoff controls described above, communities should consider restricting the use of road salt within the watershed. Salt controls on local public ways are a matter of town-meeting vote or local DPW policy. Salt use on private ways may be limited by adoption of a general bylaw or ordinance of the municipality (see Chapter 40 of MGL). (Appendix G is taken from an MAPC manual on water-resources-protection techniques and focuses upon road-salting programs.)

Forestation Practices

If it can be determined that the annual shedding of leaves from deciduous trees is a significant source of nutrients into the lake, a town should consider replacing them with coniferous trees, at least within fifty feet of the shore. Leaves also can discolor the water and clog intake pipes. Moreover, conifers tend to produce acidic humus and encourage the development of acid soils such as podzols. In very acid soils, aluminum and iron phosphates are insoluble. The aluminum will bind tightly with phosphates, helping to prevent their passage into the lake. Conifers also tend to lessen wave action by reducing wind in the winter, thereby reducing turbidity.

However, there are disadvantages to having conifers located within the watershed. They tend to use more water than hardwoods and thus reduce streamflow. Conifers have a greater capacity for interception (i.e., they take up more water) and they have greater rates of evapotranspiration (loss of water through evaporation and transpiration). For water-supply reservoirs, forestation practices which may reduce stream flow should be thoroughly evaluated.

Land Acquisition/Conservation Restrictions

If parcels of land in the watershed and especially along the lakefront are or become available for purchase, municipalities should consider land acquisition as a means of preserving open space. Limited funding is available for land acquisition.

The largest source of land-acquisition funds is the Land and Water Conservation Fund, under the US Department of Interior, National Park Service. Established by an Act of Congress in 1965, this fund provides 50 percent reimbursement of the cost of acquiring and developing lands for outdoor recreation. Approximately 4 million dollars have been allocated for 1981. Funding for 1982 is not known at this time.

Funding commitments are made on October 1, with the deadline for applications being September 1; however, applications should be completed much sooner to increase a community's chance for funding. To apply for Land and Water Conservation funds, the City Council must submit an application, and, if it is accepted, the city is guaranteed to be reimbursed for half of the project cost if it is completed as stated in the application. Recreational facilities as well as land acquisition are fundable.

Another source of funding is the Massachusetts Self-Help Program, administered by the Department of Environmental Management, Division of Conservation Services. This program provides a 50 percent reimbursement for acquisition of conservation land. Approximately $750,000 has been allocated for 1982. Only Conservation Commissions can apply for this money, which is primarily used for passive recreation. Application deadlines and reimbursement commitments by the state are the same as for the Land and Water Conservation Program described above.

The Massachusetts Urban Self-Help Program provides up to 80 percent reimbursement for acquisition of park or recreation lands in cities and towns of at least 35,000 residents which have park or recreation commissions. This program was created by Chapter 933 of the Mass. General Laws, Acts of 1977. For fiscal year 1982, one million dollars is available for land acquisition. To be eligible, communities must submit an approved conservation and/or recreation plan to the Division of Conservation Services. The plan must be updated every five years.

Municipalities may also use funding from Housing and Urban Development's Small Cities Program and Urban Development Action Grants for recreational facilities or open-space acquisition. However, eligibility for this money is based upon the extent to which the proposal will benefit low-and moderate-income persons. The Economic Development Administration also provides grants for projects in which open-space acquisition may be a part. Eligibility for these grants depends upon the extent to which such a project would increase job opportunities.

Communities do not have to purchase land outright in order to preserve its open-space qualities. They can purchase certain rights (usually development rights) to a parcel of land which would remain in private ownership. This arrangement is called a Conservation Restriction. The terms of the agreement, which are usually negotiated among the municipality, the Conservation Commission, and the property owner, specify whether or not public access is allowed. More information on Conservation Restrictions as well as land acquisition can be found in the Environmental Handbook for Mass. Conservation Commissioners, 1978 edition, by the Mass. Association of Conservation Commissions, Lincoln Filene Center, Tufts University, Medford, MA.

Regulating Motorboat Use

Large, high-speed outboard motors can create excessive noise, turbulence (increasing shore erosion and reducing water clarity), and oil and exhaust emissions, but what effect these have on the lake and residents is not clear. Past studies present conflicting evidence on the potential detrimental effects of motorboat use.

Motorboat use on ponds, except for ponds under 10 acres owned by one person, is controlled by the Director of Marine and Recreational Vehicles (EOEA) under MGL ch. 90B. The Director's regulations cover licensing, equipment, operation, and speed limits. The department may ban all motorized craft or limit use to a certain horsepower, but it is reluctant to do so. Generally, municipalities cannot adopt their own regulations without department approval. However, MGL ch. 131, s. 45 does permit municipalities to forbid use of motorboats on portions of Great Ponds between 20 and 500 acres which are within their borders. The wording of the statute is peculiar, but the opinions of several attorneys generally reach this conclusion.

Ownership Issues

Ownership of lakes and lake-shore property may create some legal problems for a management program. In general, the owners of private property around a lake which is not a great pond own the soil in pie-slice shapes to the middle of the lake. These owners also have certain "riparian" rights, including the right not to have the lake water or its level tampered with except for public necessity. Thus, although private land use around lakes and the use of the water may be controlled by use of the police power, a public health or safety emergency would be required before the community could alter water levels, dredge, or use chemicals against the will of the owners.

In most cases, however, private owners are the initiators and supporters of a management program.

In some cases private riparian owners do not own the land under the pond or control the water level. The old Mill Acts gave New England mills the power to create mill ponds by taking in eminent domain either the land itself or a "flowage easement" — the right to flood the land of others — together with the power to raise and lower the lake levels by dams. As these mills have phased out over the last 100 years, the legal rights and duties of the mill owner have generally passed to new owners of the property, who often have no use for them. The ponds and/or dams have sometimes come into municipal ownership. The Massachusetts Appeals Court held in Killian v. Brimfield (372 N.E. 2d 270, 1978) that the town's duty to maintain a dam necessarily gave it a right to maintain the water in the pond.

Finally, "great ponds" (usually defined as ponds which cover 10 acres or more in their natural condition) and their underlying soil are owned by the state, unless sold off at some time. A DEQE waterways license is required for any work in a great pond, and the level may not be altered except for agricultural or industrial use without the permission of the Department of Environmental Management under MGL ch. 91, s. 19A.

In addition to the above general watershed-protection measures, the Appendix contains specific recommendations for protection of Ell Pond. Regulations pertaining to fuel storage (Appendix A and B), hazardous materials (Appendix C and E), stormwater runoff (Appendix F), road salt (Appendix G), wetlands protection (Appendix H), and sewer leakage (Appendix I) are included in the appendices.

APPENDIX

A. Model Bylaw for Underground Fuel and Chemical Storage

B. Fuel-Spill Contingency Plan

C. Hazardous-Materials-Spill Contingency Plan

D. Procedure for Reporting Fuel Spills

E. General Bylaw — Hazardous Materials

F. Controlling Stormwater Runoff

G. Road-Salting Program

H. Wetlands Protection

I. Sewer-Leakage Control

J. DEQE BASELINE WATER-QUALITY DATA

APPENDIX A

Model Bylaw for Underground Fuel and Chemical Storage

Section I.

Purpose: The purpose of this bylaw is to control the installation and use of underground fuel and chemical-storage tanks in order to protect the groundwater and surface water from contamination due to leakage.

Section II.

Control Standards

(A) The following regulations apply to all underground fuel- and chemical-storage tanks:

(1) Any spill or loss of product shall be reported to the Fire Chief.

(2) All leaking tanks shall be emptied within 24 hours of leak detection and shall be removed within 14 working days.

(3) All new tanks shall provide adequate corrosion protection and shall be installed in accordance with the manufacturers' recommendations and the requirements of the Fire Chief.

(4) No tank shall be installed within a floodplain or wetland area, or within 200 feet of a surface-water supply.

(5) All tanks installed within 4 feet of the maximum groundwater elevation (as determined between December 1 and April 30) or within the cone of influence of a town well shall be subject to the design standards contained in Section II(B)(1)(a) of this bylaw and, in addition, shall be vaulted in concrete.

(B) The following additional regulations shall apply to all underground fuel and chemical-storage tanks with a capacity of 1500 gallons or more.

(1) Installation:

(a) In areas that have been determined noncorrosive by a soil test performed by a qualified person, steel, interior-coated (with anti-corrosive material) tanks may be installed in accordance with the specifications of 527 CMR 9.04(5). In corrosive areas or at sites where corrosion tests have not been conducted, tanks shall be constructed of non-corrodable materials such as fiber-glass-reinforced plastic (FRP) or its equivalent; steel with external bonded non-corrodable material; or a steel system cathodically protected by an impressed-current cathodic system, sacrificial anodes, or some other type of equivalent protection. If sacrificial anodes have been installed, their proper operation shall be confirmed by a qualified

person at least once a year. If an impressed-current cathodic-protection system is installed, at least once a month the operator shall verify that it is operating and at least once a year a qualified person shall conduct an on-site test and inspection to measure the structure-to-soil and structure-to-structure potentials, and the rectifier voltage and current output.

(b) New underground tanks shall be tested for tightness hydrostatically or with air pressure at not less than 3 pounds per square inch and not more than 5 pounds per square inch for at least 12 hours after installation but before being covered or placed in use.

(2) Maintenance:

(a) Owners of existing tanks (or their agents) shall file with the fire chief the size, type, age, condition, and location of each tank, and the type of fuel or chemical stored, on or before January 1, 1982. Evidence of the installation date, including any permits, shall be submitted.

(b) Owners of existing tanks (or their agents) for which evidence of installation is not available shall, at the order of the fire chief, have such tanks tested in accordance with Section II(B) (3)(a) of this bylaw. If the tank is not product-tight it shall be removed and may be replaced in accordance with Section II(B)(1)(a) of this bylaw.

(c) Owners (or their agents) of underground tanks shall maintain daily inventory records and shall make said records available to the fire chief upon request and upon application for a permit or license renewal.

(3) Testing:

(a) All tanks shall, at the expense of the owner, be subject to one of the following tests at five-year intervals from the date of installation, up to the 15th year, and annually thereafter: a 12-hour 5PSI air-pressure test performed on an empty tank; a Kent-Moore test; or a Sun-Mark leak-locator test.

(b) The fire chief shall be given at least 48 hours' notice of the time, date and place of testing.

(c) Any tank that is found not to be product-tight shall be upgraded or replaced with a system that provides adequate protection, in accordance with the design standards contained in Section II(B)(1)(a) of this bylaw.

(d) Non-conforming steel tanks installed before January 1, 1962 shall be removed and properly disposed of by January 1, 1982.

(e) If it is necessary to replace an underground steel tank that has developed a corrosion-induced leak, all other steel tanks at the facility of the same age or older, whether they are leaking or not, shall be interior-coated or replaced with tanks that meet the requirements of Section II(B)(1)(a) of this bylaw.

Section III

Administration:

(a) The provisions of this bylaw shall be administered by the fire chief.

(b) Variances from the specific requirements of this bylaw may be authorized by the board of selectmen after notice and a public hearing.

(c) Permits or licenses issued for underground fuel- and chemical-storage tanks shall be renewed at five-year intervals from the date of installation, up to the 15th year, and annually thereafter. Tank owners shall submit to the fire chief a statement certifying satisfactory leak-detection results at least 30 days before the issuance of a permit renewal for the time periods specified herein. Test results shall accompany the permit-renewal application and, where applicable, the fire chief shall forward said information to the board of selectmen for review and disposition.

(d) Fees necessary for the issuance and renewal of permits or licenses shall be set by the board of selectmen.

APPENDIX B

Fuel-Spill Contingency Plan: Fuel Leakage or Spills

When fuel spills, it is important to follow proper procedures to ensure the prompt and safe containment and cleanup of the material. Chapter 21 of the Massachusetts General Laws gives the Massachusetts Division of Water Pollution Control sole authority for cleaning up spills that enter the waters of the Commonwealth. Local officials, therefore, are not authorized to handle the spilled substance but can take the following steps to contain it.

1. Develop a standard procedure for reporting spills (see attached form) and distribute it to all concerned town departments, including the Fire Department, Board of Health, Police Department, Board of Selectmen, and Conservation Commission.

2. Equip one or more town departments with oil-absorbent booms to be used to contain the spill.

3. Contact all applicable town departments and the Division of Water Pollution Control. Follow the latter's instructions.

4. Inspect the site of the spill and note the characteristics of the spilled substance. Do not come into contact with the substance or strike a match near the area.

5. If the spill can be contained, place a row of oil-absorbent booms around it.

6. Wait for the field representative from the Division of Water Pollution Control to arrive, checking the spill periodically.

7. Each community should adopt a fuel-spill contingency plan, such as the model plan presented herein.

8. Each community should consider adoption of a hazardous-materials bylaw. A model bylaw is in Appendix I.

9. Measures should be taken to ensure the safe and clean operation of gas stations in the watershed. Applications for construction of new service stations should be carefully reviewed, and permits should be issued only when compliance with strict safety standards can be ensured.

The Division of Water Pollution Control is revising the state Emergency Response plan. Any changes to this procedure will be relayed to the fire department.

APPENDIX C

Hazardous-Materials-Spill Contingency Plan: Transportation Accidents

More caution should be exercised in the event of a hazardous-material spill than for a fuel spill. Although fuel is technically considered a hazardous material, it is a known quantity, one that most local fire departments have coped with on numerous occasions. The procedure for responding to a spill of

a hazardous material other than fuel, therefore, emphasizes expeditious reporting, careful observation, and cleanup by only one designated state authority.

If an accident occurs involving rail cars or trucks carrying hazardous materials in the watershed, the following steps should be taken. Local authorities are not authorized to handle the spilled substance and should follow the directions of the state Division of Water Pollution Control.

1. Contact the local fire department immediately. Do not go near or downwind of the accident area or create any spark that could ignite the substance or the vapors (including starting an internal-combustion engine).

2. The fire department should call the oil- and hazardous-material-spill hotline of the state Division of Water Pollution Control (727-6373). If the substance has been identified, tell the Division the name, projected quantity, and all other pertinent information.

3. Follow the instructions of the Division of Water Pollution Control. In most cases the Division will tell firefighters to follow the instructions for substances in the Hazardous Materials Emergency Action Guide, published by the US Department of Transportation (commonly referred to as "the red book"). Additional copies of this book are available from the State Fire Marshall's office.

4. Unless the Division of Water Pollution Control gives instructions to the contrary, wait until its representative arrives to commence cleanup action.

FUEL-SPILL CONTINGENCY PLAN: PROCEDURE FOR REPORTING FUEL SPILLS

DATE:_____ TIME:_____

I. CALLER: _____(Name)

_____(address & phone)

LOCATION OF SPILL_____

DESCRIPTION OF AREA AFFECTED _____

_____

CHARACTERISTICS OF SPILLED MATERIAL: fuel _____

color _____ odor _____ sheen _____

PROPERTY OWNER: _____(name)

_____(address & phone)

_____(business or firm)

TIME OBSERVED _____ TIME OF SPILL _____

ESTIMATED NO. OF GALLONS _____

SOURCE OF SPILL _____

HAS SOURCE BEEN CONTAINED? _____

HAS SPILL BEEN CONTAINED? _____

II. NOTIFY THE FOLLOWING AUTHORITIES:

_____ Fire Department
_____ Board of Health
_____ Police
_____ Board of Selectmen
_____ Conservation Commission
_____ Mass. Division of Water Pollution Control (727-6373)

III. SITE INSPECTION

DATE: _____ TIME: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(note property owner*, drainage structures, extent of spill, possible source, fuel characteristics, etc.).

IV. CALL WATER-POLLUTION CONTROL TO VERIFY REPORT - REQUEST SERVICE**

V. FOLLOWUP NOTES: _____

_____

_____

_____

_____

*Water-Pollution Control notifies owner and contacts suspected sources. Abutting property owners are also contacted by W.P.C. if the spill poses a threat to their safety.

** Water-Pollution Control prefers to contact one of the licensed contractors. If WPC cannot be reached, however, JETLINE can be contacted at 843-2829. Note that MGL Chapter 21, as amended, gives the Division of Water Pollution Control sole authority for cleaning up spills that enter "any of the waters of the Commonwealth."

APPENDIX E

General Bylaw - Hazardous Materials
(including underground fuel storage)

SECTION 1: AUTHORITY

This Bylaw is adopted by the town under its home-rule powers, its police powers to protect the public health and welfare, and its authorization under Mass. Gen. Laws, Ch. 40, S21.

SECTION 2: PURPOSE

The purpose of this Bylaw is to protect, preserve, and maintain the existing and potential groundwater supply, groundwater-recharge areas, and surface water within the town from contamination with hazardous materials.

SECTION 3: DEFINITIONS

The following definitions shall apply in the interpretation and implementation of this Bylaw.

SECTION 3.1

"Hazardous material" means a product or waste or combination of substances which because of quantity, concentration, or physical, or chemical, or infectious characteristics poses in the Board of Health's judgment a substantial present or potential hazard to the human health, safety, or welfare, or the environment when improperly treated, stored, transported, used or disposed of, or otherwise managed. Any substance deemed a hazardous waste in Mass. Gen. Laws, Ch. 21C, shall also be deemed a hazardous material for the purpose of this Bylaw.

SECTION 3:2

"Discharge" means the disposal, deposit, injection, dumping, spilling, leaking, incineration, or placing of any hazardous material into or on any land or water so that such hazardous material or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwaters.

SECTION 4: REGISTRATION

SECTION 4: 1

Every owner or operator of a commercial or industrial establishment (including home occupations) storing hazardous materials in quantities totaling more than fifty gallons liquid volume or twenty-five pounds dry weight shall register with the Board of Health the types, quantities, location, and method of storage of said hazardous materials. Registration required by this provision shall be initially submitted by (initial date) and annually thereafter within thirty days of (month, day) each year.

SECTION 4:2

Owners or operators of commercial or industrial establishments who have not previously registered in accordance with Subsection 4:1 shall, if they meet registration requirement, register initially within thirty days of meeting such requirements and thereafter within thirty days of (month, day) each year.

SECTION 4:3

In addition to registration, owners or operators of commercial or industrial establishments registered in accordance with Subsections 4:1 and 4:2 shall maintain on the premises an inventory, reconciled on a monthly basis, of purchase, use, sale, and disposal of hazardous materials. The purpose of this account is to detect any product loss and to provide an ongoing record of all quantities or hazardous materials within the town over the registration threshold.

SECTION 4:4

Upon the request of the Board of Health, owners or operators shall produce within twenty-four hours the latest reconciled inventory.

SECTION 4:5: HAZARDOUS WASTES GENERALLY

Wastes containing hazardous materials shall be held on the premises in product-tight containers for removal by a licensed carrier and for disposal in accordance with the Massachusetts Hazardous Waste Management Act, Mass. Gen. Laws, Ch. 21C.

SECTION 4:6: ABOVEGROUND STORAGE OF HAZARDOUS WASTES

Aboveground containers of wastes containing hazardous materials shall be stored on a surface impervious to the material being stored. The storage area shall be enclosed by a permanent dike of impermeable construction. The volume of the area enclosed by the dike shall be equal to or greater than the capacity of the containers within the dike.

SECTION 5: UNDERGROUND STORAGE

The following provisions shall apply to all underground liquid-hazardous-material storage systems with capacities greater than one thousand gallons.

SECTION 5:1

Owners shall file with the Board of Health the size, type, age, and location of each tank, and the type of hazardous material stored in each, on or before (initial date). Evidence of date of purchase and installation, including Fire Department permit, if any, shall be included along with a sketch map showing the location of such tanks on the property.

SECTION 5:2

Owners of tanks for which evidence of installation date is not available shall, at the order of the Board of Health, have such tank systems tested. If either the Board of Health or the Head of the Fire Department determines that the tank is not product-tight, it shall be disposed of under the direction of the Board of Health or the Head of the Fire Department.

SECTION 5:3

All steel tanks shall be subject to one of the following tests 15 years after installation and annually after 20 years or if evidence of installation date is not available: a five-pounds-per-square-inch air-pressure test performed on an empty tank, or a Kent-Moore Pressure test, or any other testing system approved in advance by the Board of Health or the Head of the Fire Department. Certification of testing shall be submitted to the Board of Health and the Head of the Fire Department. Any tanks failing the test shall be disposed of under the direction of the Board of Health or the Head of the Fire Department.

SECTION 5:4

Newly installed tanks shall be protected from internal and external corrosion and shall be of a design approved by the Board of Health and the Head of the Fire Department. The following tank-construction systems are considered to provide adequate corrosion protection: all fiberglass construction, steel with bonded fiberglass and internal lining; the Steel Tank Institute 3-Way Protection System; and such other tank construction systems as the Board of Health and the Head of the Fire Department shall approve.

SECTION 6

The following provisions apply to all underground hazardous-material storage systems of any capacity.

SECTION 6:1

All leaking tanks must be emptied by the owner or operator within twelve hours of leak detection and removed by the owner or operator in a time period to be determined by the Board of Health.

SECTION 6:2

All tank installations within four feet of high water table or within one hundred feet of a surface water body shall be of fiberglass construction. The Board of Health and the Head of the Fire Department shall determine if the installation is to be vaulted or anchored.

SECTION 7: VARIANCES

The Board of Health may vary the application of any provision of this Bylaw, unless otherwise required by law, in any case when, in its opinion, the applicant has demonstrated that an equivalent degree of environmental protection required under this Bylaw will still be achieved. The applicant at his own expense must notify all abutters by certified mail at least ten days before the Board of Health meeting at which the variance request will be considered. The notification shall state the variance sought and the reasons therefore. Any variance granted by the Board of Health shall be in writing. Any denial of a variance shall also be in writing and shall contain a brief statement of the reasons for the denial.

SECTION 8: ENFORCEMENT

SECTION 8:1 PROTECTION

All discharges of hazardous material within the town are prohibited.

SECTION 8:2: REPORTING OF DISCHARGE

Any person having knowledge of a discharge of hazardous material shall immediately report the discharge to the Board of Health, and if involving flammable or explosive materials, to the Head of the Fire Department.

SECTION 8:3: RIGHT OF ENTRY

The Board of Health and its agents may enter upon privately owned property for the purpose of performing their duties under this Bylaw.

SECTION 8:4: PENALTY

Any person who violates any provision of this Bylaw shall be punished by a fine of not more than ($___). Each day or portion thereof during which a violation continues shall constitute a separate offense; if more than one, each condition violated shall constitute a separate offense. This Bylaw may be enforced pursuant to Mass. Gen. Laws ch. 40, S21D by a Town police officer or other officer having police powers. Upon request of the Board of Health or the Fire Department, the Board of Selectmen and Town Counsel shall take such legal action as may be necessary to enforce this Bylaw.

SECTION 9: FEES

Any person registering storage of hazardous materials pursuant to Section 4 shall pay to the (town) (Board of Health) an annual Registration Fee of ( ) dollars for every ( ) gallons or fraction thereof of storage capacity. Such fee shall be due on the same date as the annual registration. Failure to pay shall constitute a violation and shall subject the violator to the penalties of Section 8 of the Bylaw.

The Board of Health may charge for expenses incurred in the enforcement of this bylaw.

F. Controlling Stormwater Runoff

In the Ell Pond watershed, underground pipes carry runoff from streets and parking lots. Some street drains discharge tc tributary streams, while other empty storm-water runoff directly into the pond. Since the watershed is already urbanized and the drainage system is already in place, maintenance of the existing system is the most appropriate way to mitigate the effects of stormwater runoff.

The following maintenance practices are recommended:

1. Existing catch-basin sumps should be cleaned at least once each year, preferably in the spring. The DPW should check the basins periodically and for additional cleanings when necessary.

2. Street sweeping within the watershed should occur at least twice each year, once in the spring and once in the fall. Street sweepings should not be dumped within the watershed area.

Proposed drainage projects within the watershed should:

-- prevent drainage diversions out of the watershed;
-- prevent new drainage pipes from discharging directly into Ell Pond;
-- use perforated drain pipes;
-- use leaching-type catch basins; and
-- call for grease traps or oil-absorbent pillows in all catch basins that discharge directly into the pond.

G. Road-Salting Program

Communities have recently become aware of the deleterious effect of excessive deicing chemicals on everything they touch: vegetation, road surfaces, bridges, car bodies, water supplies and humans. The "bare pavement" policy is under attack. The state Department of Public Works is funding a program for covering storage piles which were formerly allowed to leach into the ground. General Law ch. 85, s. 7A requires that all persons or agencies using over one ton of deicing chemicals a year must file an annual report with the state.

The most dangerous aspect of the use of road salt is the impact upon surface reservoirs and groundwater used as municipal water supplies. Although the 1975 federal regulations adopted under the Safe Drinking Water Act failed to establish standards for sodium in drinking water, the regulations adopted in 1977 by the state DEQE endorse the AMA limitation of 20 milligrams per liter (mg/l), requiring that public water systems (suppliers having at least 15 service connections or serving an average of at least 25 individuals for at least 60 days a year) must report to their customers when the level is extended.

These chemicals may also damage the biota of streams and lakes, as set out generally below.

Another consideration is the substance often added to deicing salts to prevent caking or inhibit corrosion. One such compound is sodium ferrocyanide. Although not in itself particularly toxic, upon photodecomposition it releases cyanide ions which are extremely toxic, especially to fish. The use of such compounds should be strictly controlled.

1. Effects on Rivers and Streams

The literature shows that deicing salts usually have little effect on the plant and animal life of large rivers and streams. Because the rate of flow is so large, especially during the springtime when the bulk of the salt is released into the river, salts are substantially diluted. Large rivers rarely show a level of more than 10 to 20 milligrams per liter of dissolved chlorides, which is not dangerous.

Smaller streams and brooks may be more seriously affected, depending on their flow rate and the amount of highway runoff. The critical stress period for the biotic community is the midsummer low-flow period. Salts are still entering the streams via discharging groundwater, but the available flow for dilution is small. Potentially harmful effects depend upon the oxygen supply, water temperature, exposure time, rate of chloride increase, and levels of other chemicals in the water. The lowest concentration of chloride noted in the literature as potentially harmful to sensitive fish species such as trout is 400 mg/l. Therefore, Carr Research laboratory recommends this concentration as the maximum allowable chloride level for any naturally flowing surface water.

2. Effects on Ponds and Lakes

Two important considerations relate to the impact of deicing salts on ponds and lakes. First, all ponds and lakes are existing or potential drinking-water supplies. Therefore, the level of sodium should be kept below the recommended 20 mg/l level for safe drinking-water level. Accumulation of sodium levels would depend on the hydraulic residence time based on the number of lake flushings per year.

Secondly, high levels of salts in lakes may cause density stratification in extreme cases. The denser, salt-laden water on the bottom can prevent normal, vertical mixing, even during the natural spring and fall overturns, preventing oxygen from reaching the lower level of the lake. Lack of oxygen has an adverse effect on both plant and animal life, including fish. The minimum chloride concentrations that have been observed to prevent natural vertical mixing range from 150 to 220 mg/l. Thus Carr recommends a sustained chloride concentration of 150 mg/l as the limit for a lake's bottom waters. Maximum chloride levels are usually observed in lakes during the month of April. The potential for induced stratification is probably limited to lakes greater than 10 feet deep.

Sodium and calcium have an insignificant effect on lake eutrophication. A minute quantity of these micronutrients is sufficient to maintain significant plant and animal growth. Quantities necessary to maintain this growth are available in the natural environment, exclusive of the input from applied deicing chemicals. Therefore, neither is likely to be a limiting nutrient.

3. Effects on Health

As mentioned above, a sodium level over 20 mg/l in surface and subsurface drinking-water supplies represents a potential public problem for certain segments of the population, including persons with heart disease, hypertension, renal (kidney) disease, cirrhosis, and some pregnant women.

4. Effects on Plants

It is also worth mentioning road-salt damage to plants. Plants may be affected within a distance of approximately nine meters from the road, depending on drainage, soils, etc. In addition, salt spray from road traffic can damage foliage of evergreen trees up to 120 meters from the road. Damage occurs mainly to trees and woody shrubs. Grasses are least affected by road salt while many species of evergreen and deciduous trees are extremely susceptible, including broad-leaf types such as sugar and red maple, linden, black walnut, shagbark hickory, American elm, and speckled alder, and conifers such as red and white pine, Colorado spruce, Douglas fir and hemlock. Tolerant species include red and white oak, red cedar, black locust, quaking and large-toothed aspen, all species of birch, black cherry, white ash. Young trees are usually more susceptible than older ones.

Salt accumulation in woody plants results in leaf burn, leaf drop, stem and twig dieback, and eventual death. Salt is absorbed from the soil through the plant roots and accumulated in the woody tissue of the plant. Plants must generally be exposed to successive years of salting before they are killed. However, laboratory experiments have shown that once foliar death begins, removal of salt from the environment cannot prevent further damage, and the tree will eventually die. Damage that does not kill produces a loss in vigor that makes the tree susceptible to disease and insect damage.

Light to moderate salting (5-10 tons/lane mile/season) produces a small but noticeable decline in vegetation. Heavier salting produces extensive death. Salt levels at and above 0.3% (salts in moisture—saturation extract) affect the growth of many woody plants and herbaceous species.

5. Salt-Reduction Programs

When the community has identified areas of critical concern — brooks, lakes, wells, aquifers where the use of road salt is most likely to have a negative impact — it may use a wide variety of options to protect these areas. These include training of municipal public-works personnel in the use of deicing chemicals, construction of salt-storage sheds or covering of stockpiles, purchase of calibrated spreaders, all possible permutations and combinations of sanding and salting, substitution of other chemicals for sodium chloride, closed drainage leading into less-sensitive surface waters, and a policy of resisting the expansion or widening of highways in critical area. Alternatives sh uld be evaluated for their environmental effect, their safety, and their cost. The high price of salt substitutes may be peanuts compared to the cost of developing a new water source.

DEICING MIXTURES FOR ENVIRONMENTALLY CRITICAL AREAS

	Mixture 1	Mixture 2	Mixture 3
Spread Rate (lbs/mile of 2-lane road)	430	1500	1500
Description of Mixtures Dry ingredients	all 3:1 premix	11 parts sand 2 parts 3:1 premix	7 parts sand 2 parts 3:1 pre-mix
Amount of 50/50 propylene glycol	10	12	none
Calculated Quantites (lbs/mile of 2-lane road)			
Salt	320	180	260
Calcium Chloride	110	45	86
Sand	---	1275	1154

3:1 pre-mix = 3 parts rock salt and 1 part hydrated calcium chloride by weight

Courtesy of State of Connecticut Department of Transportation

The above matrix does not mention substitute chemicals. The most popular substitution is calcium chloride. Interdisciplinary Environmental Planning of Wayland, Mass. reports that this chemical is not harmful in New England's "soft" acidic (low pH) waters. There would not be enough calcium added to render the water "hard." There is no evidence that harder water is harmful to health. The main objection again is cost.

IEP recommends that no salt at all be used in the cone of depression surrounding wellfields, and some towns have adopted this standard for local ways. If this is not acceptable, the minimum practical amount of salting should be employed. Legal controls for state highways are in the hands of the Mass. DPW, which has been experimenting with reduced salting on chosen segments of roads.

The US EPA recommends such techniques as using mixtures of salt and calcium in ratios of 3:1 or 5:1, pre-wetting salt with solutions of calcium chloride, methyl alcohol or propylene glycol (Iowa, Michigan, New York) or even by water alone (North Dakota). A typical application rate of pre-wetting salt dispensed at the back end of a spreader is 8 gallons per ton; if applied beforehand to a full load in the truck, 10 gallons per ton pumped onto the top of the load just before the truck leaves. The EPA manual emphasizes the importance of properly trained and supervised application: salt re-

duction may require more labor. It is impossible to determine precisely the proper application rates without knowing the roads and weather, the drivers and the surrounding areas.

H. Wetlands Protection

1. All Orders of Conditions issued under the provisions of the Wetlands Protection Act should contain the following standards for development in the Ell Pond watershed:

   a. No increased runoff from the site. Retention areas, if required, should be designed to maximize groundwater recharge.

   b. Erosion and sedimentation controls.

   c. No direct discharge of surface runoff into Ell Pond or tributary surface waters.

   d. No filling of wetland areas within the watershed.

   e. No use of road salt or fertilizers within 100 feet of wetlands.

I. Sewer-Leakage Control

The Melrose DPW should request the Metropolitan District Commission (MDC) to investigate the sewer system within the Ell Pond watershed to locate any leaks that may be polluting the pond. This investigation may be conducted by the MDC or the MDC may request funding fo a study of the system.

The Massachusetts Division of Water Pollution Control administers Section 201 of the Clean Waters Act that funds sewer-facilities plans, designs and construction. Funds are also available for infiltration/inflow analyses (I/I) of existing sewer lines. The MDC may request funding for an I/I study of the sewer system within the Ell Pond watershed. If there are other areas of the city that need improvements, they should also be included. For more information on the 201 program, contact:

Mr. Paul Taurasi
DEQE Division of Water Pollution Control
1 Winter Street
Boston, MA 02108

APPENDIX J

MASSACHUSETTS DIVISION OF WATER POLLUTION CONTROL
WATER QUALITY AND RESEARCH SECTION
LAKE SURVEY DATA SHEET

LAKE/POND Ell Pond LOCATION Melrose

DRAINAGE North Coastal DATE 27 July 81

COLLECTOR(s) Notini/Beskenis TIME Start 1130 hrs.

WEATHER:

Air Temperature Low 80's °F

Wind from NW 5-10 mph

Cloud Cover 25%

SECCHI DISC:

Transparency 0.6 meters

Water Surface 5 cm waves

Water Color brown

Time 1235 hrs.

OPEN WATER
SAMPLING STATION(s)

DEPTH IN FEET	WATER TEMPERATURE	DISSOLVED OXYGEN	CHEMICAL COLLECTION	BIOLOGICAL COLLECTION	OTHER COLLECTION
STATION 1					
Surface	78°F		metals grab	Total &	pH = 9.7
0.5m	78°F	8.8 mg/l	chem	Fecal coli	Sediment Grab for metal analyses
1.0m	78°F				
2.0m	78°F				
2.5m	75°F	2.9 mg/l	chem		
STATION 2	Inlet, No Flow				
STATION 3	Storm Drain, No Flow				
STATION 4	Outlet				
	25°C	5.7 mg/l	chem	Total & Fecal Coli	pH = 7.5
STATION 5	Inlet				
	25°C	5.5 mg/l	chem	Total & Fecal Coli	pH = 7.0
STATION 6	Inlet, No Flow				

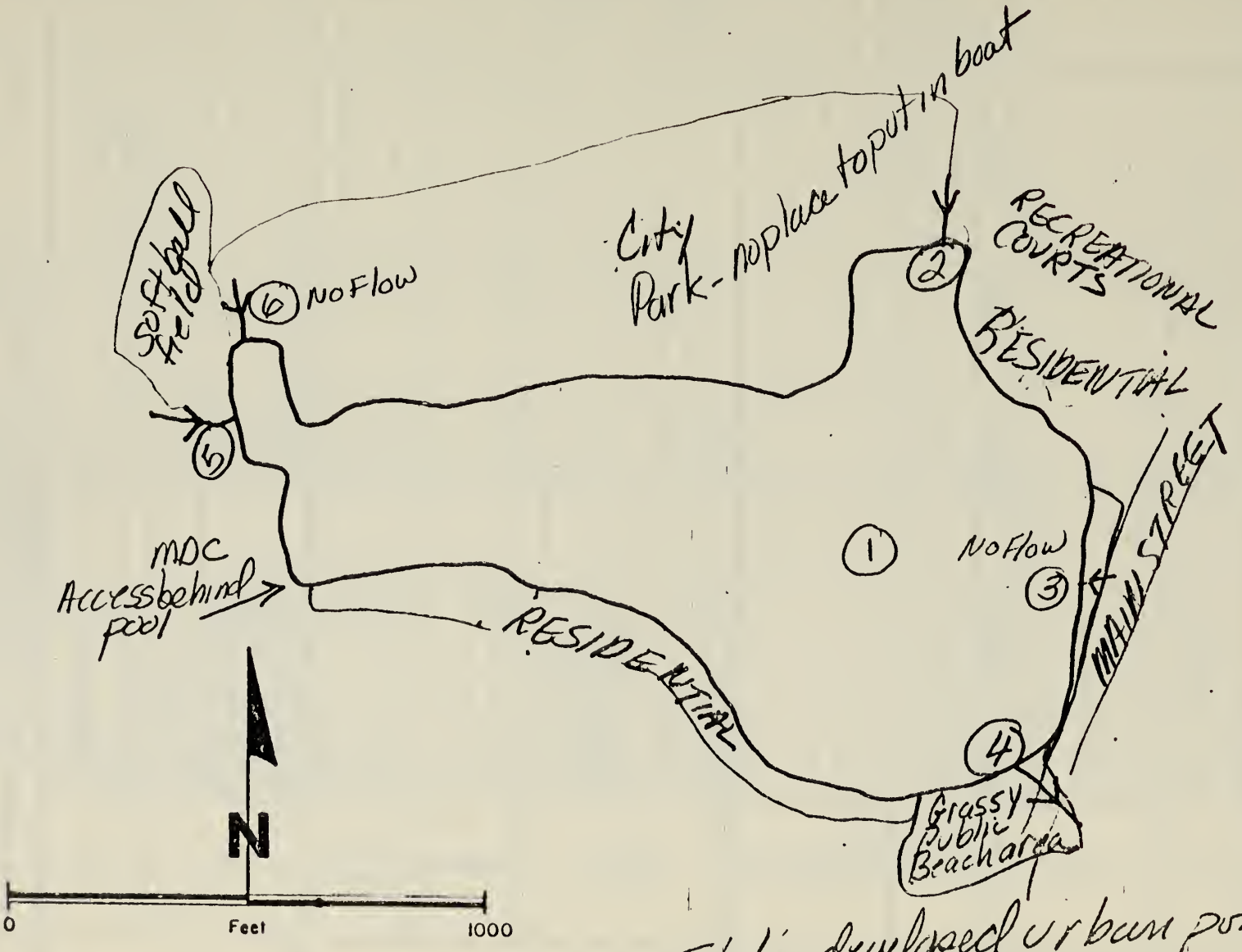
TRIBUTARY AND
OUTLET SAMPLING
STATION(s)

REMARKS Sediments very thick, full of gas, oil and grease scum on water

ELL POND
MELROSE

PRELIMINARY
FOR REVIEW ONLY

Sample Station Location and Shoreline development Map
7/27/81



Totally developed urban pond

FIGURE

SWIFT @ 200

MICROSCOPIC EXAMINATION

LAB. NO. 1036

River/Lake ELL POND Station 1 Date 7.27.81

Analysis by RE MI 1ml Count 2 STRIPS Date 7.28.81

GROUP	TYPE	ORGANISM	CODE	TALLY	CELLS/ML	TOTAL
DIATOMS	CENTRIC	MELOSIRA	++++ +++ ++++ ||	18	505.8	
		CYCLOTELLA	|	1	28.1	533.9
	PENNATE	SYNEDRA	++++ |||	8	224.8	
		NAVICULA	||	2	56.2	337.2
		DIATOMA	||	2	56.2	
BLUE-GREEN	COCCOID	ANACYSTIS	++++	5	140.5	
		MICROCYSTIS	++++ ||	7	196.7	337.2
	FILAMENTOUS					
GREEN	COCCOID	GLEOCYSTIS	++++ |	6	168.6	
		OOCYSTIS	|||	4	112.4	
		SCENEDESMUS	|||	4	112.4	702.5
		TETRAEDRON	|	1	28.1	
		COELASTRUM	+++	5	140.5	
		UNIDENTIFIED	+++	5	140.5	
	DESMIDS					
	FILAMENTOUS					
		PHACUS	|	1	28.1	
FLAGELLATES	GREEN	HAEMATOCOCCUS	++++ +++ ++++ ++++ ||	23	646.3	
		CHLAMYDOMONAS	+++	5	140.5	
		CRYPTOCHRYSIS	|	1	28.1	1180.2
		TRACHELOMONAS	++++ ||||	9	252.9	
		EUGLENA	||	2	56.2	
		UNIDENTIFIED	|	1	28.1	
	DINO.	CERATIUM	++++ ++++ +++ ++++ +++ 27, 24	76	2135.6	
		MALLOMONAS	||	2	56.2	2191.8

ORGANISM	TALLY
PROTOZOA	
ROTIFERA	? (2)
CRUSTACEA	

PRELIMINARY DATA FOR REVIEW ONLY

TOTAL LIVE ALGAE (c/ml) 5282.8

ibla = 91.37 mg/m³ SR = 28.1

DIATOM SHELLS		
	CENTRIC	
	PENNATE	

LAWRENCE EXPERIMENT STATION
WASTE WATER ANALYSIS
(mg. per liter)

MELROSE

Collector: Beskenis

SOURCE A Ell Pond, Station 1 @ Surface
SOURCE B " " " 1 @ 0.5m
SOURCE C " " " 1 @ 2.5m
SOURCE D " " " 4
SOURCE E " " " 5
SOURCE F

PRELIMINARY
FOR REVIEW ONLY

	A	B	C	D	E	F
SAMPLE NO.	R87950	R87951	R87952	R87953	R87954	
DATE OF COLLECTION	7/27/81 →					
TIME OF COLLECTION	GRAB →					
DATE RECEIVED	7/27/81 →					
COD						
BOD						
pH		7.7	6.9	6.6	6.8	
ALKALINITY, TOTAL		30	31	30	30	
SUSPENDED SOLIDS		22	22	12	0.0	
TOTAL SOLIDS		210	210	192	196	
HARDNESS		52	52	50	33	
SP. COND.		240	230	230	275	
TOTAL KIELDAHL - N		1.8	1.8	1.3	0.83	
AMMONIA - N		0.03	0.03	0.05	0.32	
NITRATE - N		0.0	0.1	0.0	0.3	
TOTAL P		0.15	0.16	0.11	0.16	
TOTAL COLIFORM	120			600	9,000	
FECAL COLIFORM	< 10			150	580	
CHLORIDE		52	53	56	70	
IRON		0.42	0.62	0.60	1.1	
MANGANESE		0.10	0.22	0.13	0.13	